

# Large-Scale Demonstration and Deployment Project (LSDDP)

## Fact Sheet

### 321-M Fuel Fabrication Facility at Savannah River Site

In Partnership with The Office of Science and Technology (EM-50)

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#### Introduction

The 321-M Fuel Fabrication Facility was built in 1956. It's mission for 40 years was to fabricate fuel and target assemblies for irradiation in the site's production reactors. Although the facility was deinventoried in 1995, holdup quantities of highly enriched uranium (HEU) still remain in the ventilation ducts and some process equipment. For 40 years, fuel machining, cutting, and fabrication operations took place on the west side of the building and resulted in the contamination of this area. Approximately 9000ft<sup>2</sup> of the 60,000ft<sup>2</sup> facility is contaminated with alpha contamination. A portion of the facility overheads is potentially contaminated. The facility roof has outlived its warranty and has started to leak.

#### Objective

The objectives of the 321-M LSDDP were to:

- Demonstrate innovative and improved D&D technologies, develop performance comparisons to existing methods and technologies, and illustrate economic and worker-related benefits.
- Test technologies to achieve meaningful cost and performance information for potential end-users.
- Utilize an ongoing D&D project for technology demonstrations, in order to qualify technologies for repetitive, reliable implementation within the DOE Complex and the commercial sector.
- Ensure the 321-M deactivation problems selected to solve are primarily focused on DOE Complex-wide problems.
- Maximize participation of Integrating Contractor Team members to improve technology identification and repetitive

transfer within the private sector, while integrating industry and academia expertise to accelerate technology progress.

- Leverage funding on the 321-M LSDDP from various DOE offices, technology vendors, and industry experts to optimize resolution of the complex problems facing federal and private entities in the D&D of nuclear facilities.

#### Technologies Demonstrated

As a result of the screening process, five technologies were ultimately selected and pursued for demonstration in the 321-M Fuel Fabrication Facility. These new and improved technologies were compared against baseline technologies.

**E-PERM™:** EPERM Detection is an alpha surface monitor that uses passive detectors to confirm decontaminated areas meet residual contamination release limits. The technology provides:

- Improved sensitivity to low levels of contamination
- Improved accuracy
- Reduced personnel exposure and potential for contamination
- Reduced Cost

**ALARA 1146 Strippable Coating:** The ALARA™ 1146 Cavity Decon is a strippable coating technology used for the decontamination and immobilization of surface contamination. It is a vinyl-based coating approved for the decontamination of reactor cavities during reactor outages. Applied by spraying, brushing, or rolling, the coating migrates into micro-voids of surfaces to contact contaminants. ALARA 1146 is the technology of choice for smaller area decontamination jobs where very low



mobilization/demobilization costs make up for the higher unit costs.

**X-Ray, K-Edge Heavy Metal Detector:** The X-Ray, K-Edge Heavy Metal Detection System uses the characteristic absorption of x-rays in heavy metals. An x-ray beam is passed through an unknown material. At an element-specific energy, corresponding to the binding energy of the K-shell electrons for that material, x-ray transmission is significantly reduced. An energy sensitive high purity germanium detector (HPGe) is used to analyze the transmitted beam. For assay jobs over 6000 feet of ventilation duct, X-Ray, K-Edge unit cost savings will overcome the fixed costs of the technology and make this technique the method of choice.

**Long Range Alpha Detection (LRAD):** The BNFL Instruments IonSens™ Monitor measures alpha contamination on surfaces by detecting the ionized air molecules produced by the alpha particles when they interact with ambient air. The device includes three modular units; an input filter

unit, a component chamber, and a detector unit. IonSens™ has the ability to survey areas such as the internal surface of pipe where hand probe and smears are not possible. It provides computer printout of surveys and is faster than hand surveys of larger items.

**Size Reduction Machine:** The Size Reduction Machine (SRM) is a non-robotic, manually moved machine mounted with a hydraulic shear. The machine is a mechanical assist device that takes the weight of the shear off the operator during size reduction of contaminated components or pieces. The machine is capable of shearing items from 1 foot below to 16-18 feet above floor level, and is capable of cutting within 4 inches of a wall or floor surface. The hydraulic shears are capable of cutting 3"x3" SS angles, 4" Schedule 40 pipes, or 3.5"x 1/2" flat bar. The SRM improves the safety and efficiency of Dismantlement and Waste Handling operations. The resultant size reduced waste is easier to handle and results in the generation of fewer waste containers.

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[http://www.netl.doe.gov/dd/project\\_sites/lstdp/savannah/doc/srs\\_website/srs\\_website.html](http://www.netl.doe.gov/dd/project_sites/lstdp/savannah/doc/srs_website/srs_website.html)

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